

# Chapter 3: Status and Recovery of ESA-Listed Salmon and Steelhead

PCSRF restoration and recovery efforts are directed at restoring Chinook, coho, sockeye, and chum salmon and steelhead. There are 16 salmon Evolutionarily Significant Units (ESUs) and 10 steelhead Distinct Population Segments (DPSs) that are listed as threatened or endangered. These designations identify species populations that are in danger of extinction or likely to become so in the foreseeable future, requiring attention and protection to reach self-sustaining and genetically diverse levels. The distribution of salmon ESUs and steelhead DPSs along the Pacific Coast is displayed in Exhibit 3-1.

## Recovery Domains

The 26 ESA-listed salmon ESUs and steelhead DPSs discussed in this chapter are grouped into seven geographic recovery domains, as shown inside the back cover. This chapter also includes a discussion about one restoration area that was previously designated as a recovery domain. The grouping by recovery domain allows an ecosystem approach to identifying recovery needs and needed actions for multiple ESUs/DPSs in a geographic area.

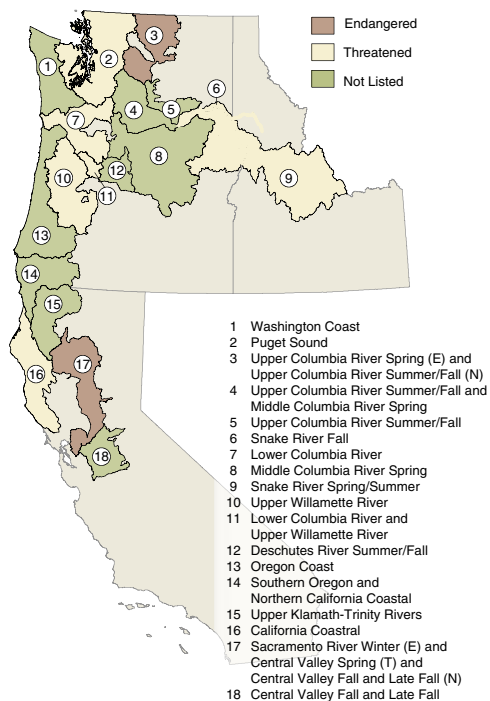
## Abundance and Major Factors Limiting Recovery

The following pages present a picture of current knowledge, including abundance and factors limiting recovery of salmon and steelhead by recovery domain. The graphics show estimates of adult returns (including percentages of wild and hatchery fish where known), estimates of historical population size, and major factors limiting recovery. The major limiting factors listed represent the set of conditions that inhibit recovery. The relative impact of various factors, however, can change over time. In general, if the major limiting factors are not addressed, the ESA-listed salmon and steelhead are not likely to recover. The PCSRF project activities that address these factors are also included in this chapter.

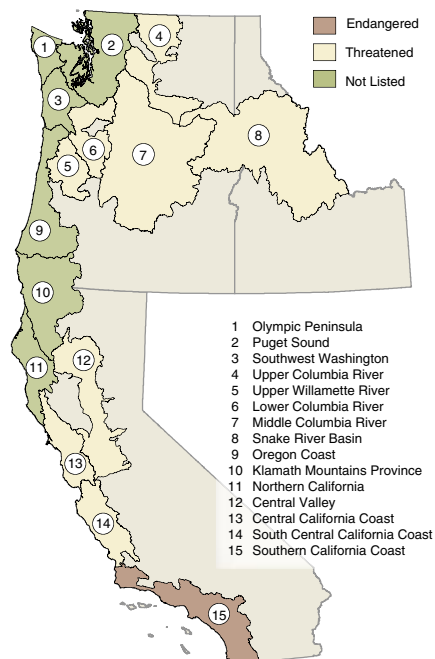
The primary goal of PCSRF is to improve the overall condition of Pacific Coast salmon through habitat protection and restoration to sustain the species when external conditions produce high and low population cycles. The habitat factors that PCSRF can address tend to be linked, and efforts to improve habitat are cumulative, meaning that the habitat value for salmon is increased as each limiting factor is addressed systematically.

## Exhibit 3-1: Distribution of Salmon ESUs and Steelhead DPSs

### Chinook



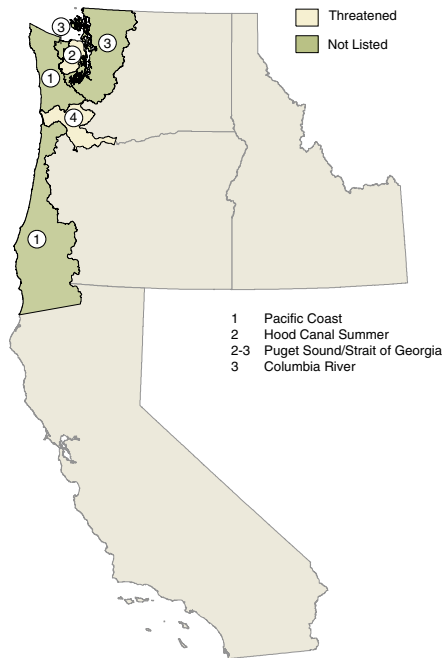
### Steelhead



### Sockeye



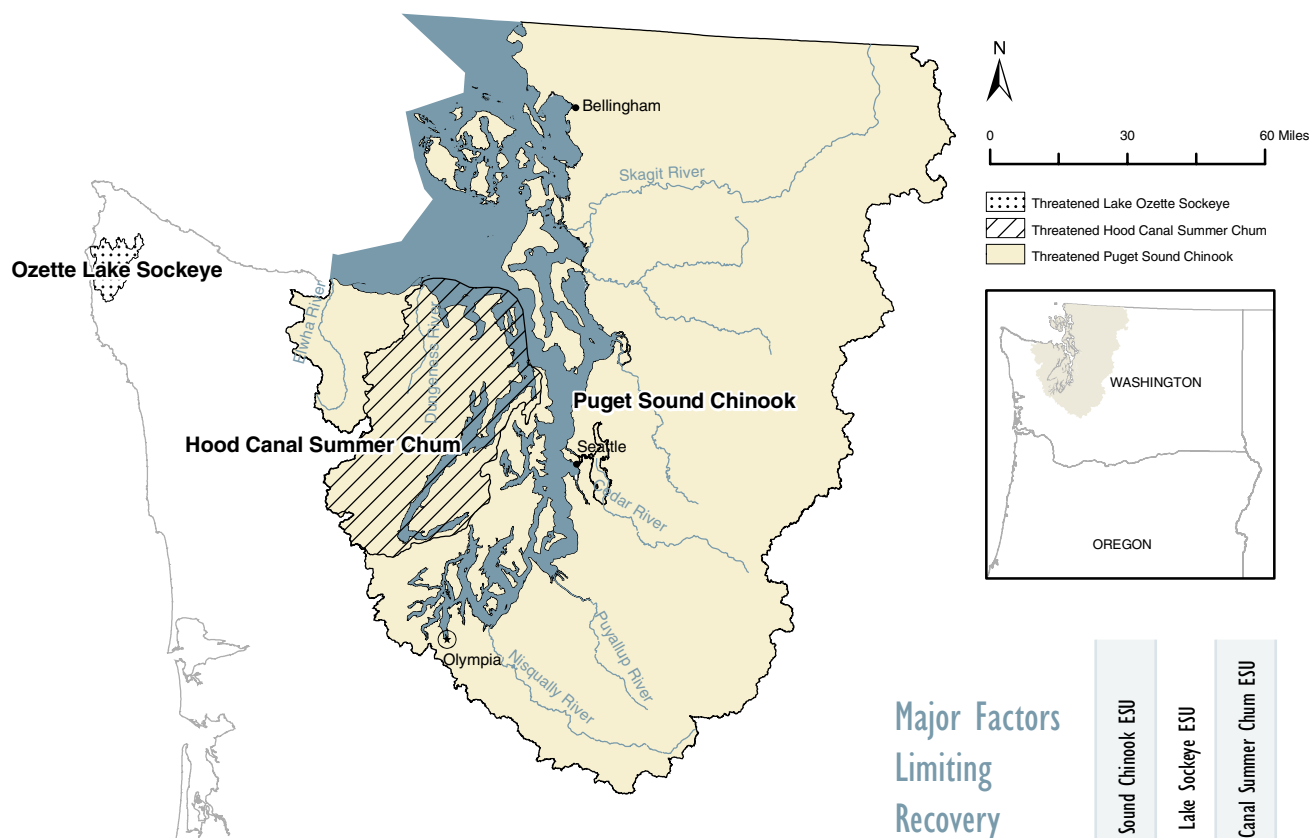
### Chum



### Coho



## Exhibit 3-2: Puget Sound Recovery Domain



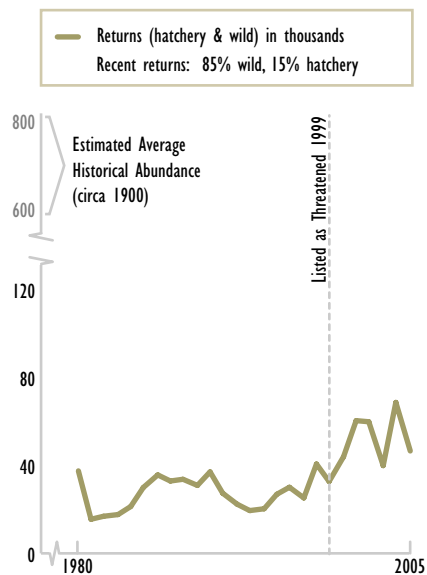
### PCSRF Activities in the Recovery Domain

- » Restored 81 stream miles of instream habitat
- » Restored 92 acres of upland habitat and reduced impacts from 197 miles of road
- » Restored 855 acres and 94 stream miles of riparian habitat
- » Restored 109 acres and created 41 acres of wetland habitat
- » Restored 2,034 acres and created 1,022 acres of estuarine habitat
- » Protected 7,947 acres and 79 stream miles of habitat through land acquisition, easement, or lease
- » Treated 177 acres of riparian habitat for invasive species
- » Treated 1,088 acres of estuarine habitat for invasive species
- » Removed 78 barriers to fish passage opening 182 stream miles

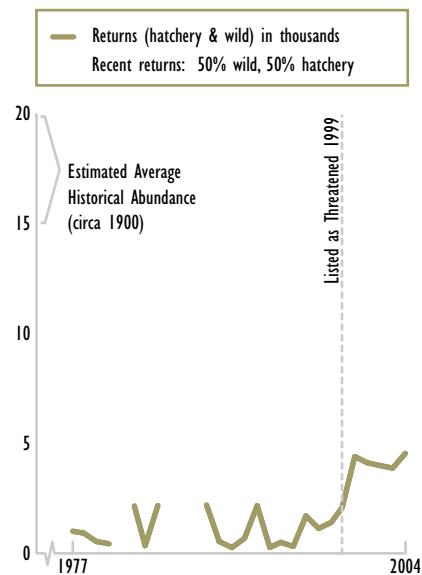
### Major Factors Limiting Recovery

	Puget Sound Chinook ESU	Ozette Lake Sockeye ESU	Hood Canal Summer Chum ESU
Degraded floodplain and in-river channel structure	●		●
Riparian area degradation and loss of in-river large woody debris	●	●	●
Degraded tributaries/river habitat conditions		●	
Degraded estuarine conditions and loss of estuarine habitat	●		●
Excessive sediment in spawning gravels	●	●	●
Degraded water quality	●		●
High water temperature	●		
Reduced streamflow in migration areas			●
Predation on adults by otters or seals		●	●
Project Activities Addressing Habitat Limiting Factors	62%	100%	72%

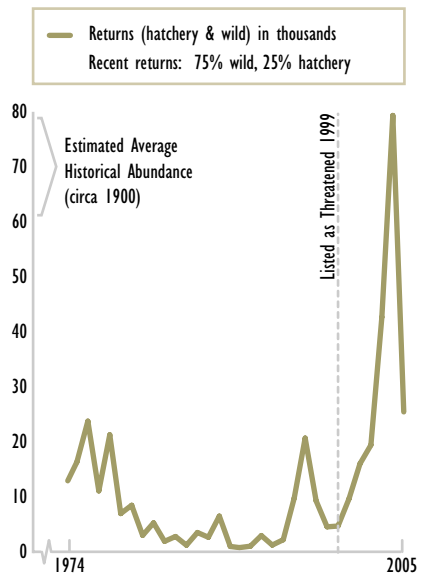
### Puget Sound Chinook ESU



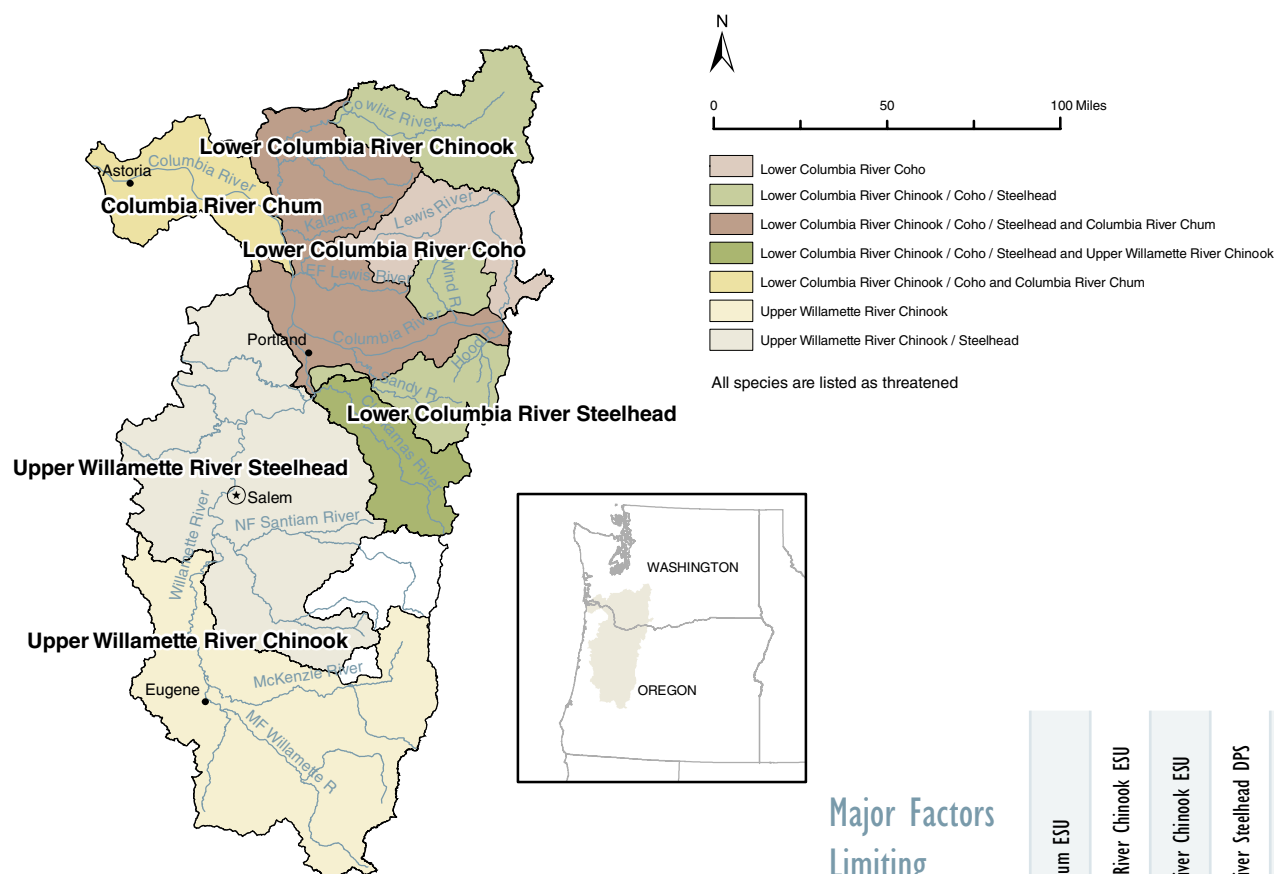
### Ozette Lake Sockeye ESU



### Hood Canal Summer Chum ESU



## Exhibit 3-3: Willamette/Lower Columbia Recovery Domain



### PCSRF Activities in the Recovery Domain

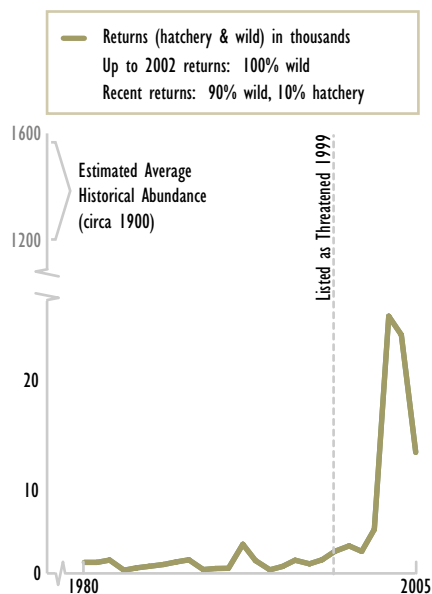
- » Restored 75 stream miles of instream habitat
- » Restored 760 acres of upland habitat
- » Restored 1,123 acres and 211 stream miles of riparian habitat
- » Restored 2,440 acres and created 35 acres of wetland habitat
- » Restored 659 acres and created 1,286 acres of estuarine habitat
- » Protected 1,843 acres and 25 stream miles of habitat through land acquisition, easement, or lease
- » Treated 492 acres of riparian habitat for invasive species
- » Removed 131 barriers to fish passage opening 416 stream miles

### Major Factors Limiting Recovery

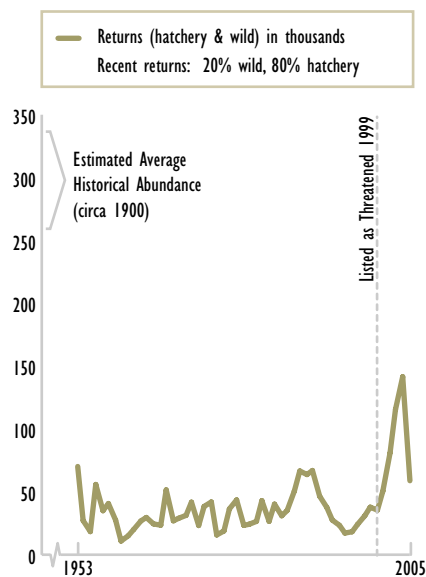
	Columbia River Chum ESU	Upper Willamette River Chinook ESU	Lower Columbia River Chinook ESU	Lower Columbia River Steelhead DPS	Upper Willamette River Steelhead DPS	Lower Columbia River Coho ESU*
Altered channel morphology and stability	●		●	●		
Lost/degraded floodplain connectivity and lowland stream habitat		●		●	●	
Loss of habitat diversity	●		●			
Excessive sediment	●		●	●		
Degraded water quality		●			●	
High water temperature		●	●	●	●	
Reduced streamflow	●	●		●	●	
Reduced access to spawning/rearing habitat		●	●	●	●	
Harassment of spawners	●					
Harvest impacts			●			
Project Activities Addressing Habitat Limiting Factors	58%	61%	62%	67%	54%	•

\* Limiting factors have not been identified.

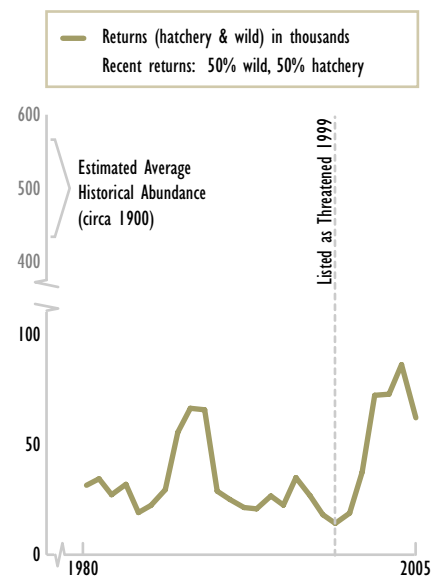
### Columbia River Chum ESU



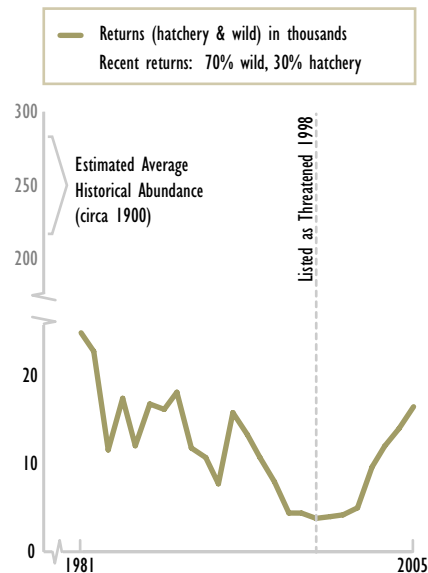
### Upper Willamette River Chinook ESU



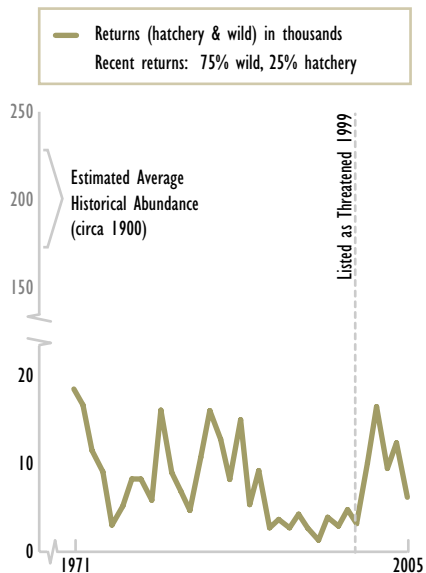
### Lower Columbia River Chinook ESU



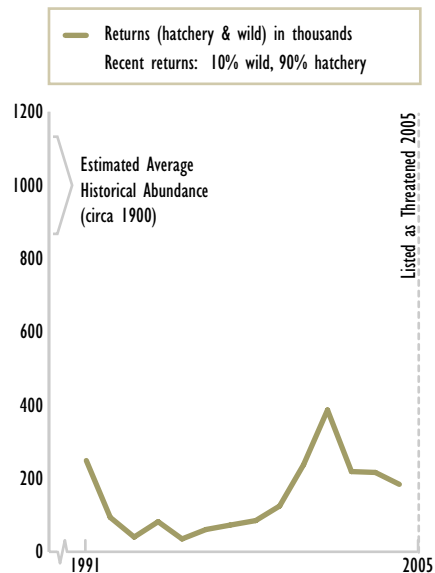
### Lower Columbia River Steelhead DPS



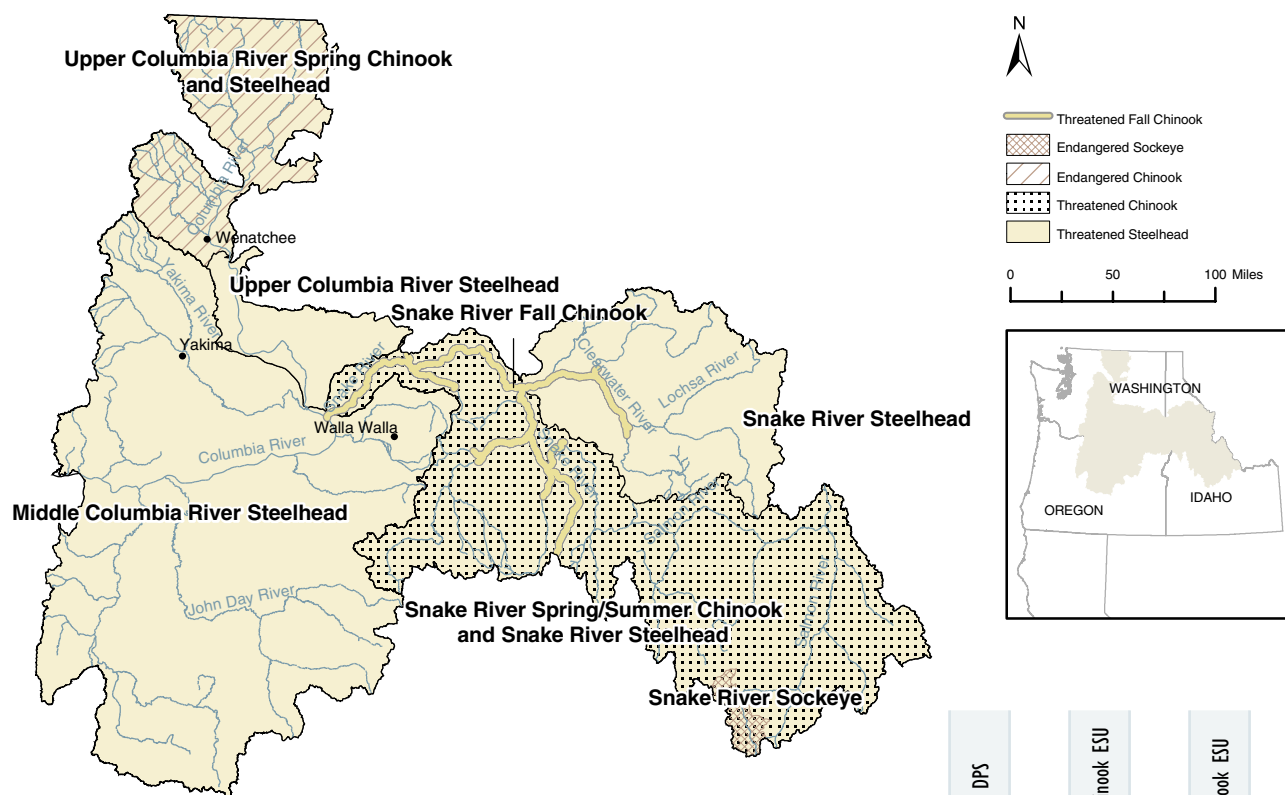
### Upper Willamette River Steelhead DPS



### Lower Columbia River Coho ESU



## Exhibit 3-4: Interior Columbia Recovery Domain



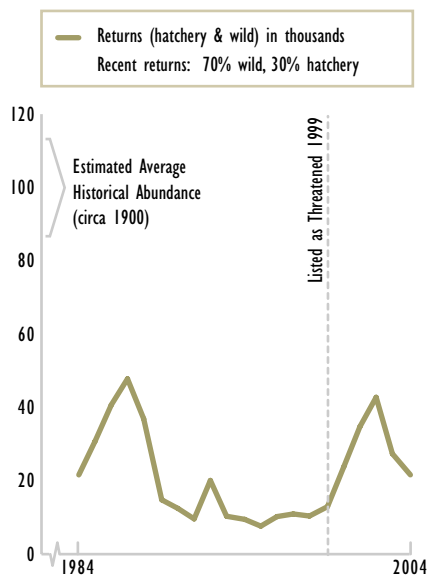
### Major Factors Limiting Recovery

### PCSRF Activities in the Recovery Domain

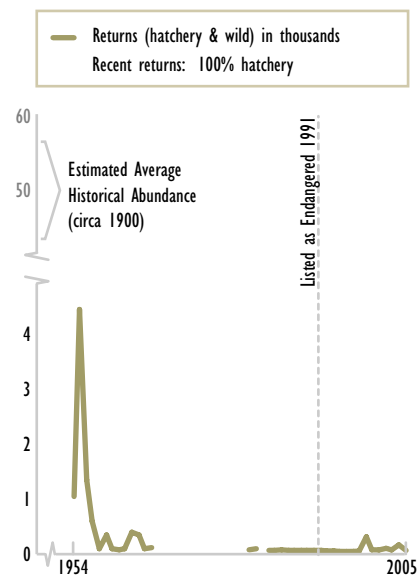
- » Restored 281 stream miles of instream habitat
- » Restored 76,391 acres of upland habitat and reduced impacts from 123 miles of road
- » Restored 2,824 acres and 455 stream miles of riparian habitat
- » Restored 1,145 acres of wetland habitat
- » Protected 49,328 acres and 198 stream miles of habitat through land acquisition, easement, or lease
- » Treated 651 acres of riparian habitat for invasive species
- » Removed 194 barriers to fish passage opening 1,391 stream miles
- » Installed 432 fish screens
- » Returned 714 cubic feet per second of water to instream flow

	Middle Columbia River Steelhead DPS	Snake River Fall Chinook ESU	Upper Columbia River Spring Chinook ESU	Snake River Sockeye ESU	Snake River Spring/Summer Chinook ESU	Snake River Steelhead DPS	Upper Columbia River Steelhead DPS
Altered channel morphology and flood plain	●		●	●	●	●	●
Riparian degradation and loss of in-river large woody debris			●				●
Excessive sediment	●				●	●	●
Reduced spawning/rearing habitat		●					
Degraded water quality	●	●			●	●	●
Reduced streamflow	●		●	●	●	●	●
Impaired passage	●		●	●			
Hydropower system mortality	●	●	●	●	●	●	●
Harvest impacts		●	●			●	●
Hatchery impacts						●	●
Project Activities Addressing Habitat Limiting Factors	91%	33%	63%	0%	79%	78%	58%

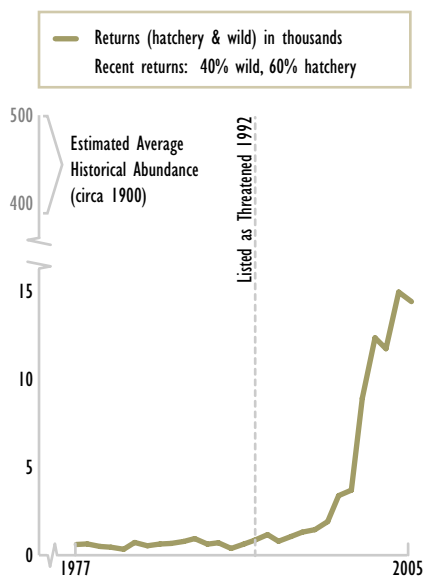
### Middle Columbia River Steelhead DPS



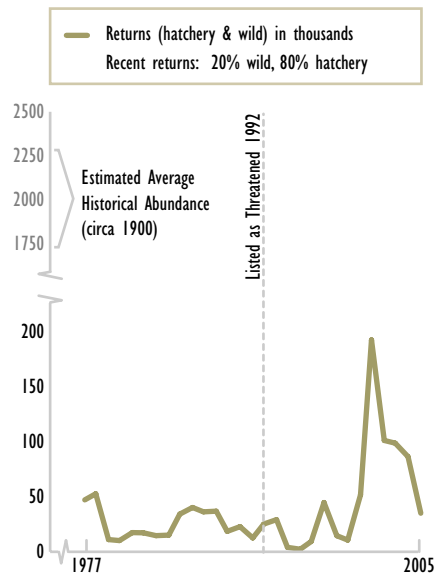
### Snake River Sockeye ESU



### Snake River Fall Chinook ESU

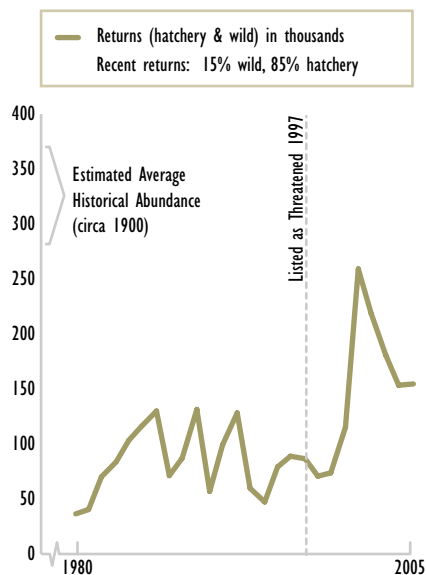


### Snake River Spring/Summer Chinook ESU

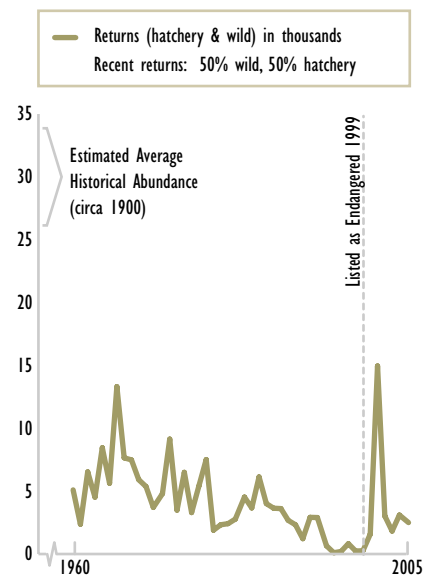




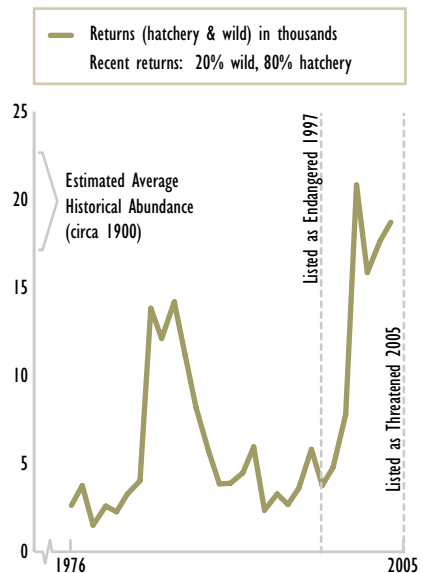
### Snake River Steelhead DPS



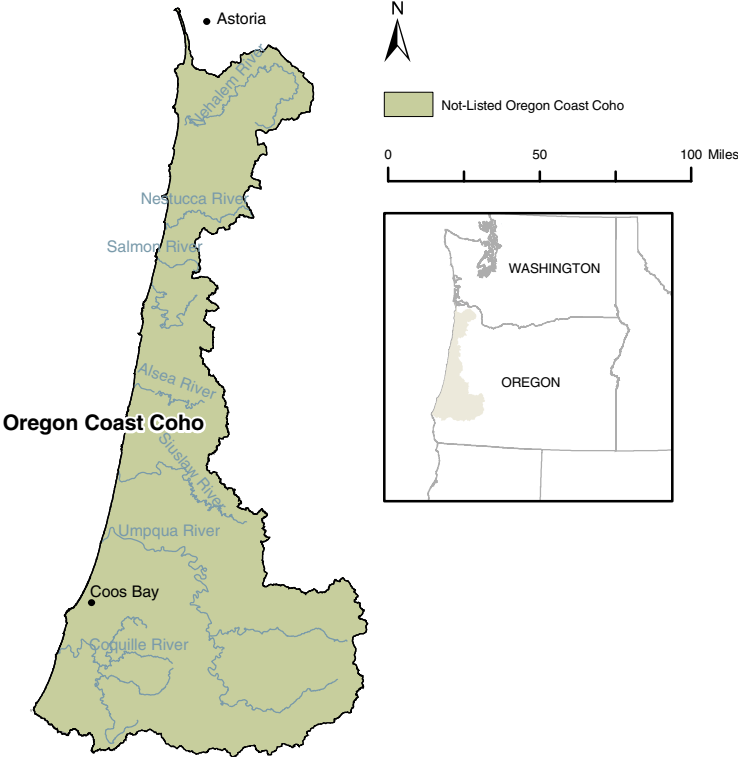
### Upper Columbia River Spring Chinook ESU



### Upper Columbia River Steelhead DPS



# Exhibit 3-5: Oregon Coast Restoration Area\*



## Habitat Factors

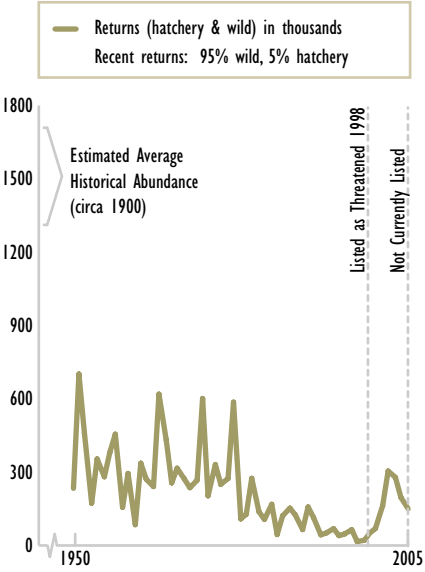
	Oregon Coast Coho ESU
Altered stream morphology and complexity	●
Reduced habitat capacity	●
Loss of over-wintering habitat	●
Excessive sediment	●
High water temperature	●
Variation in ocean conditions	●
Project Activities Addressing Habitat Factors	70%

## PCSRF Activities in the Restoration Area

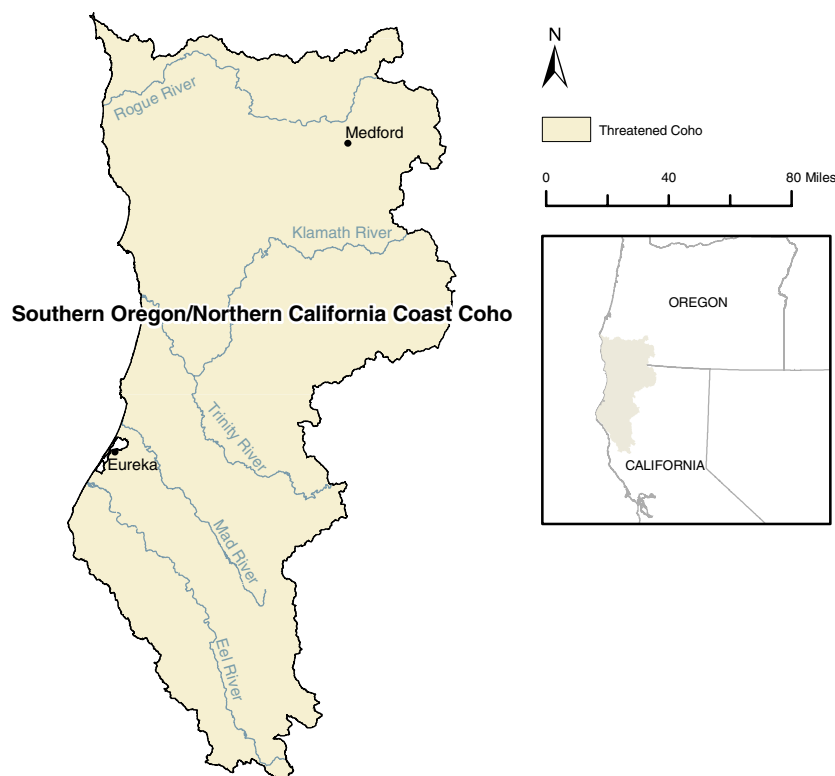
- » Restored 147 stream miles of instream habitat
- » Restored 110 acres of upland habitat and reduced impacts from 66 miles of road
- » Restored 1,010 acres and 229 stream miles of riparian habitat
- » Restored 57 acres of wetland habitat
- » Protected 1,294 acres of habitat through land acquisition, easement, or lease
- » Removed 342 barriers to fish passage opening 338 stream miles
- » Installed 15 fish screens

\* Previously designated a recovery domain when Oregon coast coho were listed.

## Oregon Coast Coho ESU



## Exhibit 3-6: Southern Oregon/Northern California Coast Recovery Domain



### Major Factors Limiting Recovery

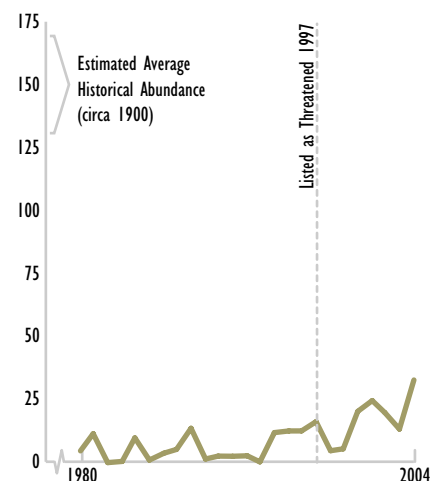
Major Factors Limiting Recovery	Southern Oregon/Northern California Coast Coho ESU
Loss of channel complexity	●
Loss of estuarine and floodplain habitat	●
Loss of riparian habitat	●
Loss of in-river wood	●
Excessive sediment	●
Degraded water quality	●
High water temperature	●
Reduced streamflow	●
Unscreened water diversions	●
Structures blocking fish passage	●
Project Activities Addressing Habitat Limiting Factors	78%

### Southern Oregon/Northern California Coast Coho ESU\*

#### PCSRF Activities in the Recovery Domain

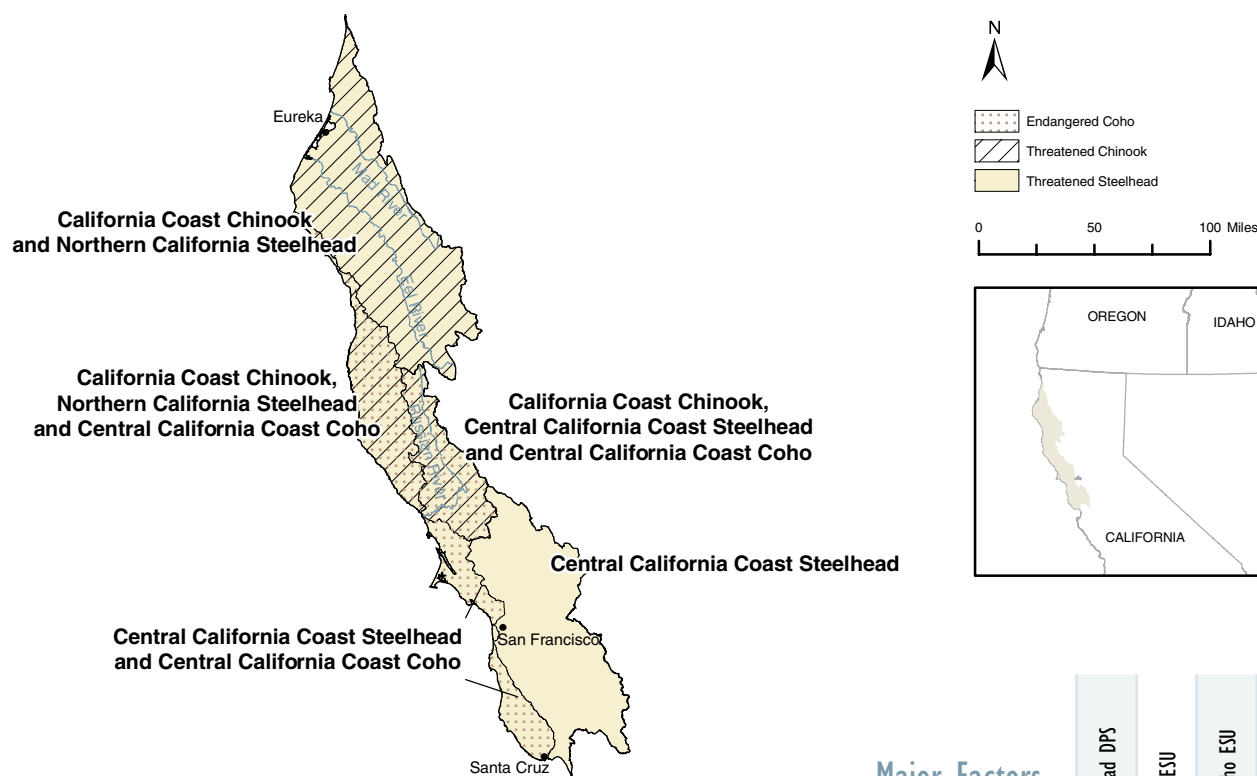
- » Restored 30 stream miles of instream habitat
- » Restored 1,490 acres of upland habitat and reduced impacts from 598 miles of road
- » Restored 375 acres and 132 stream miles of riparian habitat
- » Protected 25,206 acres of habitat through land acquisition, easement, or lease
- » Removed 201 barriers to fish passage opening 226 stream miles
- » Installed 74 fish screens
- » Returned 40 cubic feet per second of water to instream flow

— Returns (hatchery & wild) in thousands  
Recent returns: 52% wild, 48% hatchery



\* Note: The data set represents the Rogue River basin, providing information for only a portion of the ESU.

## Exhibit 3-7: North-Central California Coast Recovery Domain



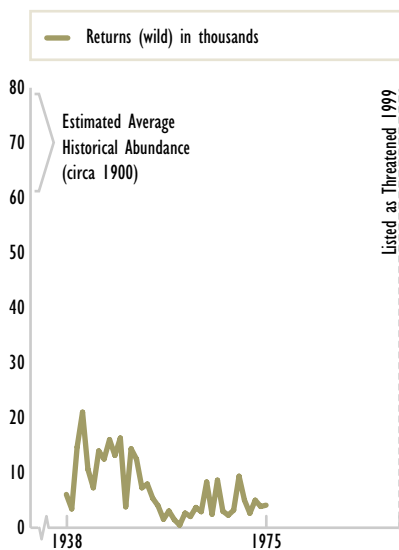
### PCSRF Activities in the Recovery Domain

- » Restored 35 stream miles of instream habitat
- » Reduced impacts from 267 miles of road in upland habitat
- » Restored 24 stream miles of riparian habitat
- » Removed 83 barriers to fish passage opening 159 stream miles

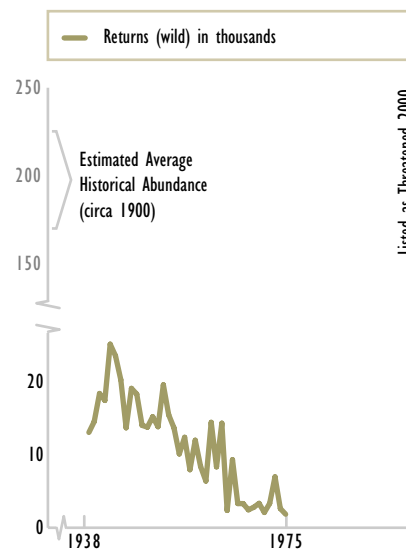
### Major Factors Limiting Recovery

	Northern California Steelhead DPS	California Coastal Chinook ESU	Central California Coast Coho ESU	Central California Coast Steelhead DPS
Loss of channel complexity	●	●	●	●
Urbanization			●	●
Excessive sediment	●	●	●	●
Loss of floodplain and estuarine habitats	●	●	●	●
Loss of riparian habitat	●	●	●	●
Degraded water quality	●	●	●	●
Reduced access to spawning and rearing habitat	●	●	●	●
Unscreened water diversions	●	●	●	●
Project Activities Addressing Habitat Limiting Factors	83%	84%	79%	82%

### California Coastal Chinook ESU\*



### Northern California Steelhead DPS\*



### Central California Coast Steelhead DPS

No abundance time series data are available.

- » Listed as Threatened 1997
- » Historical estimate: 94,000
- » Current estimate: 14,100

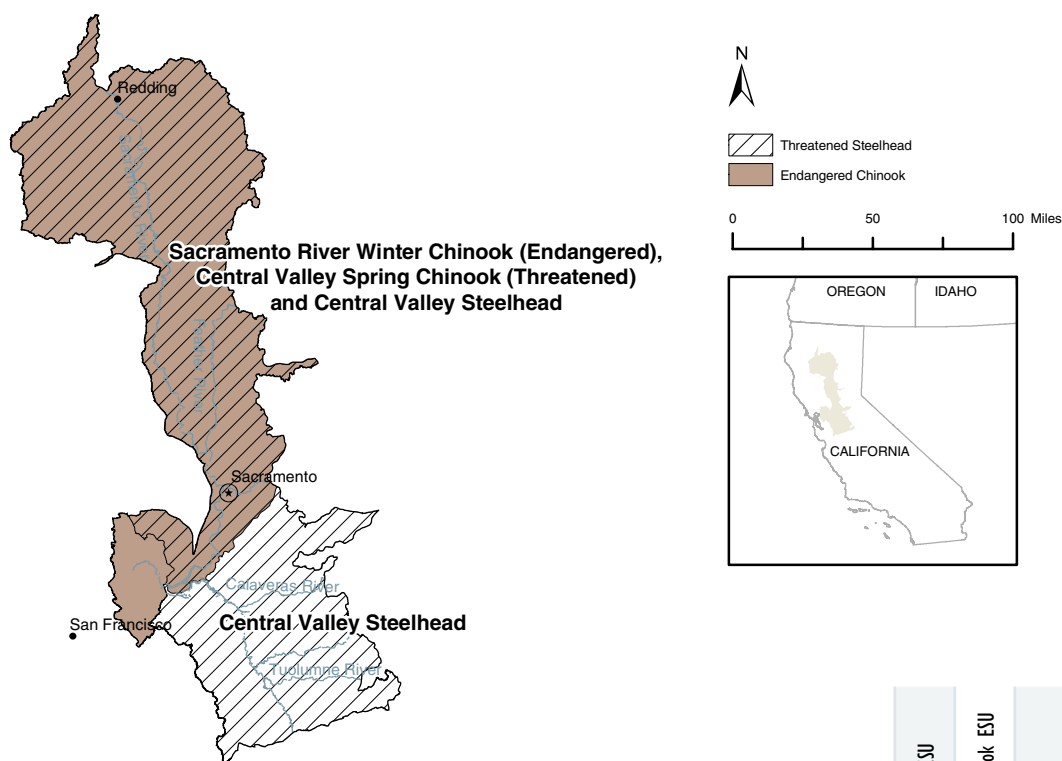
### Central California Coast Coho ESU

No abundance time series data are available.

- » Listed as Threatened 1996
- » Status changed to Endangered 2005
- » Historical estimate: 56,100
- » Current estimate: 6,160

\* Data from dam counts on the South Fork Eel River from 1938–1975 represent the best available for the California Coast Chinook ESU and the Northern California Steelhead DPS and are shown here. There are no abundance time series data available after 1975.

## Exhibit 3-8: Central Valley Recovery Domain\*



### Activities in the Recovery Domain

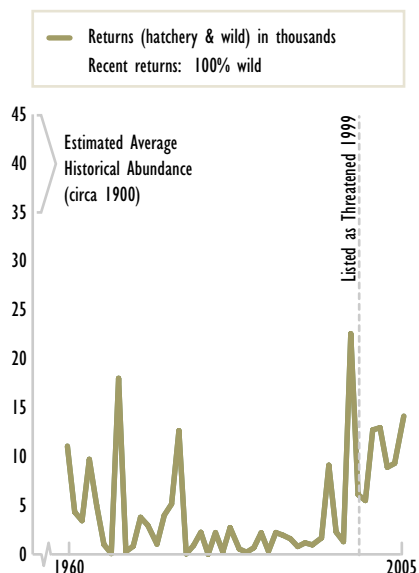
- » Evaluating termination of the captive broodstock hatchery program for Sacramento Winter Chinook
- » Increasing water releases from dams
- » Improving water quality and water supply through cooperative efforts by CALFED
- » Modifying dams to improve habitat, temperature, and flow
- » Screening water diversions
- » Enhancing efforts to reduce illegal harvest
- » Planning Battle Creek dam removal program
- » Improving stream flows

### Major Factors Limiting Recovery

	Central Valley Spring Chinook ESU	Sacramento River Winter Chinook ESU	Central Valley Steelhead DPS
Altered and degraded habitat	●	●	●
Reduced streamflow		●	
Degraded water quality	●		●
High temperature	●	●	●
Reduced access to spawning and rearing habitat	●	●	●
Unscreened water diversions			●
Hatchery impacts	●		●
Single population in low abundance		●	

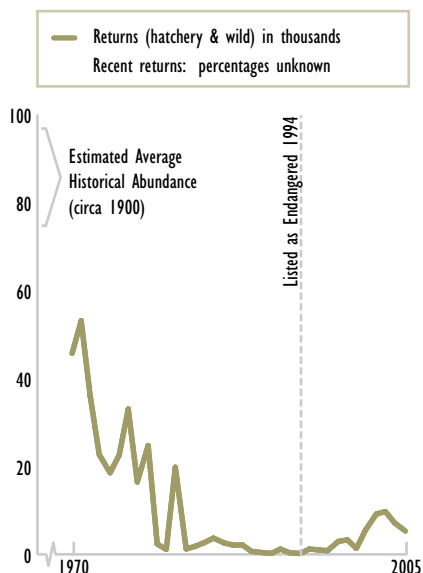
\* PCSRF funds were not allocated to projects in this recovery domain.

## Central Valley Spring Chinook ESU



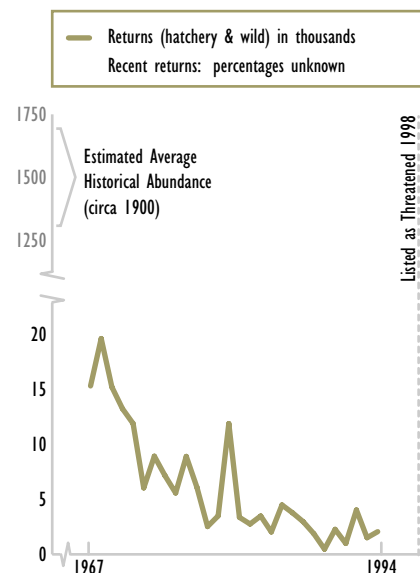
Note: For the purpose of data continuity between years, carcass counts officially recognized by tribes and state and federal agencies are not included in the abundance figures.

## Sacramento River Winter Chinook ESU



Note: For the purpose of data continuity between years, carcass counts officially recognized by tribes and state and federal agencies are not included in the abundance figures.

## Central Valley Steelhead DPS



Note: The data set represents dam counts from 1967–1994 at the Red Bluff Diversion Dam fish ladders, providing information on only a representative portion of the DPS.

## PCSRF Planning

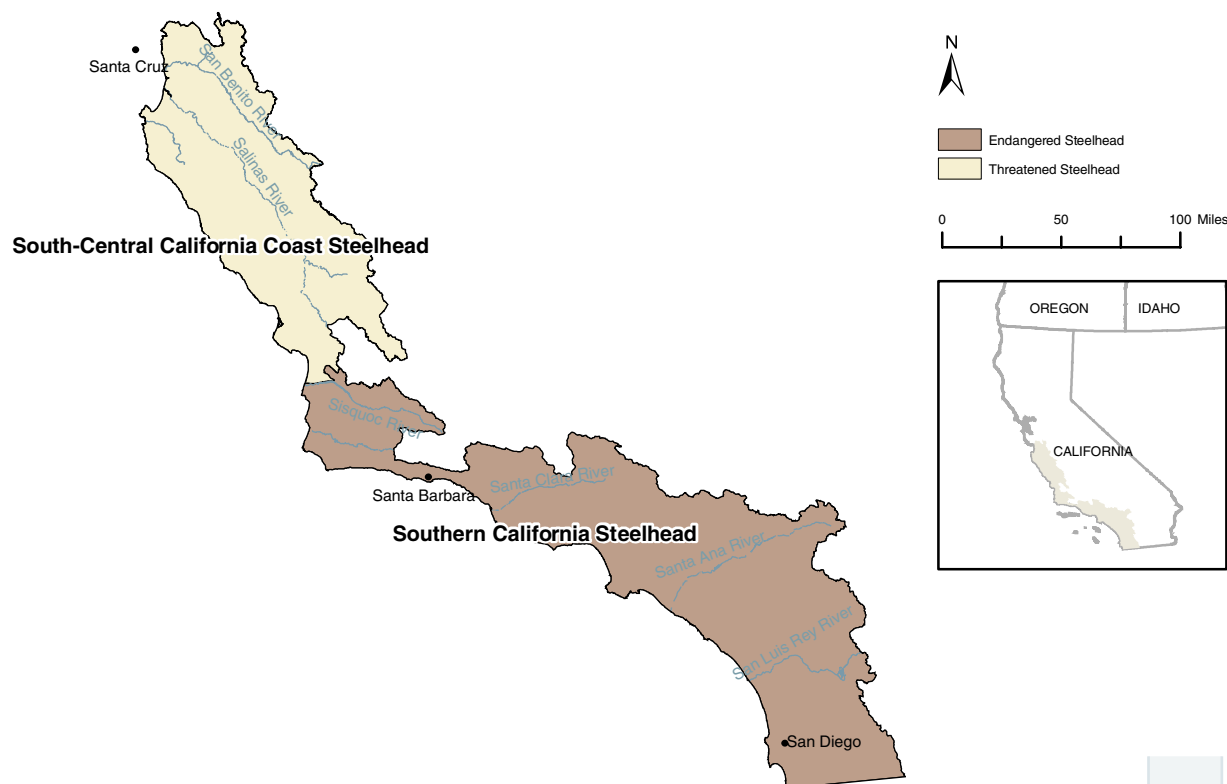
Recovery planning involves multiple and diverse activities, including plan development and establishing funding priorities and requirements. States and tribes not only contribute to the development of recovery plans, but also participate in setting priorities and performance requirements for funding sources such as the PCSRF. NMFS has reviewed and assessed PCSRF recovery project outputs and found that PCSRF funds can and do effectively contribute to the recovery needs of ESA-listed salmon and steelhead.

NMFS has established Technical Recovery Teams (TRTs) for each recovery domain to advise recovery planners on the relationships between habitat and fish productivity (number of returning adults produced by the parent spawner), the spatial distribution of fish and their habitats, and aspects of diversity including the expression of different life history traits (run timing, relative habitat use, age structure, size).

These four elements—abundance, productivity, spatial distribution, and genetic diversity—must be considered when developing recovery plans and determining whether a species is recovered. These elements are also essential in the planning and review of the effectiveness of PCSRF-funded projects in addressing the recovery needs of each ESU. For more information see: <http://www.nwr.noaa.gov/Salmon-Recovery-Planning/ESA-Recovery-Plans/Draft-Plans.cfm>.



## Exhibit 3-9: South-Central/Southern California Coast Recovery Domain



### PCSRF Activities in the Recovery Domain

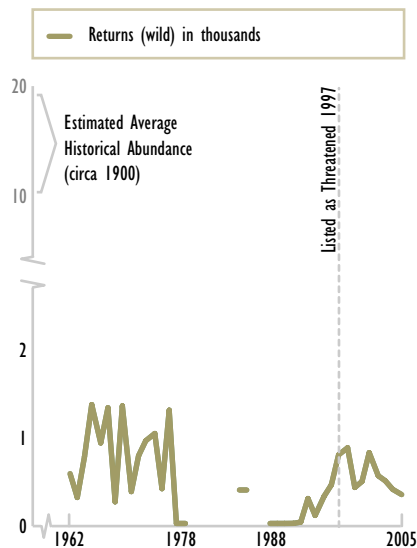
- » Reduced impacts from 29 miles of road in upland habitat
- » Protected 1,191 acres of habitat through land acquisition, easement, or lease
- » Removed 32 barriers to fish passage opening 167 stream miles

### Major Factors Limiting Recovery

	South-Central California Coast Steelhead DPS	Southern California Steelhead DPS
Altered channel morphology and floodplain	●	●
Sedimentation of spawning and rearing habitat	●	●
Degraded water quality	●	
Alteration of natural streamflow patterns	●	●
Physical impediments to fish passage	●	●
Hatchery impacts	●	●
Exotic species	●	●
Recreational angling	●	●
Project Activities Addressing Habitat Limiting Factors	83%	96%



## South-Central California Coast Steelhead DPS



Note: The data set represents dam counts at the San Clemente Dam fish ladder on the Carmel River, providing information for only a portion of the ESU. Fish count methodology changed in 1980. No records exist for 1978–83 and 1985–87. It is also estimated that between 10–50% of steelhead spawn below the dam.

## Southern California Steelhead DPS

No abundance time series data are available.

- » Listed as endangered 1997; range extended 2002
- » Historic estimate 32,000–46,000
- » Current estimate <100 fish

## Recovery Planning

Recovery plans are required for species listed under the ESA. Recovery plans provide a framework for identifying the recovery and restoration actions necessary to address the key factors limiting the species. Each recovery domain has a Technical Recovery Team (TRT) charged with providing the technical basis for the recovery plans. In the region, NMFS and the TRTs have worked cooperatively with the multiple entities within recovery domains, including government agencies, landowners, and other interested parties involved in salmon recovery, to ensure the development of recovery plans that can be implemented.

In the first years of the PCSRF, several projects focused on planning and watershed assessments. These projects were critical first steps in identifying the factors limiting recovery to provide the basis for ensuring resources for restoration projects are targeted appropriately. Recovery plans help to prioritize implementation of recovery actions.

As salmon recovery planning has progressed, these locally developed plans have been aggregated at different levels, depending on the recovery domain, and submitted to NMFS to meet the requirements of the ESA. Recovery plans within the Pacific region are in varying stages of development as summarized in Exhibit 3-10.

Ongoing monitoring is an important component of recovery planning to assess with scientific certainty whether recovery actions are appropriate. The PCSRF is supporting planning, assessment, and monitoring activities in all domains. Additionally, as was described in Chapter 2, other monitoring programs are being established to ensure that resources are invested where and when needed to support restoration and recovery of salmon and steelhead populations.

Exhibit 3-10: Status of Recovery Plans by Recovery Domain

	Statewide Recovery Strategy	Draft Interim Regional ESA Recovery Plan	Final Interim Regional ESA Recovery Plan	Proposed ESA Recovery Plan	Final ESA Recovery Plan
<b>Puget Sound Recovery Domain</b>					
Puget Sound Chinook	WA Strategy <sup>7</sup>			●	○
Hood Canal Summer Chum	WA Strategy <sup>7</sup>			●	
Ozette Lake Sockeye	WA Strategy <sup>7</sup>	●			
<b>Willamette/Lower Columbia Recovery Domain</b>					
Lower Columbia Chinook and Steelhead; Columbia Chum					
Washington Lower Columbia Management Unit	WA Strategy <sup>7</sup>		●		
Oregon Lower Columbia Management Unit	OR Plan <sup>8</sup>				
Upper Willamette Chinook and Steelhead	OR Plan <sup>8</sup>				
<b>Interior Columbia Recovery Domain</b>					
Upper Columbia Steelhead and Spring Chinook	WA Strategy <sup>7</sup>	●			
Middle Columbia Steelhead					
Eastern Washington Lower Snake Management Unit	WA Strategy <sup>7</sup>	●			
Washington Yakima River Management Unit	WA Strategy <sup>7</sup>	●			
Oregon Management Unit	OR Plan <sup>8</sup>				
Washington Columbia Gorge Management Unit	WA Strategy <sup>7</sup>				
Snake River Sockeye, Fall and Spring Chinook, and Snake River Basin Steelhead					
Eastern Washington Lower Snake River Management Unit	WA Strategy <sup>7</sup>	●			
Oregon Snake River Basin Management Unit	OR Plan <sup>8</sup>				
Idaho Snake River Basin Management Unit					
<b>Southern Oregon/Northern California Coast Recovery Domain</b>					
North-Central California Coast Recovery Domain	CA Strategy <sup>9</sup>				
Central Valley Recovery Domain					
South-Central/Southern California Coast Recovery Domain					

<sup>7</sup> *Statewide Strategy to Recover Salmon—Extinction Is Not an Option*, 1999, <http://www.governor.wa.gov/gsro/publications/strategy/summary.htm>.

<sup>8</sup> *Oregon Plan for Salmon and Watersheds*, 1999, <http://egov.oregon.gov/OPSW/>.

<sup>9</sup> *Recovery Strategy for California Coho*, February 2004, <http://www.dfg.ca.gov/nafwb/CohoRecovery/RecoveryStrategy.html>.

● = Completed

● = Initial Draft Completed

○ = Expected in late 2006